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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

LUU, THANH X

ART UNIT

PAPER NUMBER

2878

DATE MAILED: 03/18/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/654,550

Applicant(s)

IWASA, YOSHIRO

Examiner

Thanh X Luu

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2878

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 January 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2,3,5 and 11-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 11 and 15 is/are allowed.
- 6) ☒ Claim(s) 2,3,5,12-14 and 16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on January 14, 2003 has been entered.

Claims 2, 3, 5 and 11-16 are currently pending.

Specification

2. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Examiner suggests further adding an optical transfer device to the title.

Claim Objections

3. Claims 3, 5 and 14 are objected to because of the following informalities:

In claim 3, last line, "the optical fiber" lacks proper antecedent basis.

In claim 5, "the optical signal transfer device" lacks proper antecedent basis. It is unclear if "at least one signal transfer device embedded" is the same signal transfer device directly contacting the light-receiving element. Examiner recommends using the terms --the at least one optical signal transfer device--.

In claim 14, line 7, "the mounting substrate" lacks proper antecedent basis.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claim 14 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The specification fails to describe an embodiment in which a light-emitting surface transfers "the optical signal from an arithmetic processing apparatus as an optical signal." Conventional light-emitting devices (LEDs) require electrical input and outputs optical signals.

Examiner believes an electrical signal comes from the arithmetic processing circuit to the light-emitting surface, which transfers the electrical signal as an optical signal. In response, Applicant should point to specific sections of the specification which support such an embodiment or amend the claim appropriately.

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. While applicant may be his or her own lexicographer, a term in a claim may not be given a meaning repugnant to the usual meaning of that term. See *In re Hill*, 161 F.2d 367, 73 USPQ 482 (CCPA 1947). The term "optical signal transfer device" in claim 14 is used by the claim to mean "light-emitting device," while the accepted meaning is

"a device that transfers optical signals, i.e. an element that takes in an optical signal and outputs an optical signal at a different location", e.g. an optical fiber or a waveguide.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claim 16 is rejected under 35 U.S.C. 102(b) as being anticipated by either one of Kitamura (U.S. Patent 5,250,816) or Frazier (U.S. Patent 5,199,087).

Regarding claim 16, Kitamura discloses (see Figure 7) a semiconductor device, comprising: a semiconductor chip (11) and a light-receiving element (11a) formed in the semiconductor chip for receiving an optical signal, wherein the semiconductor chip is disposed in a first plane (a first horizontal plane); and an optical signal transfer device (17') directly connected to the light-receiving element for transferring the optical signal into the semiconductor chip, wherein the optical signal transfer device is disposed in a second plane (a second horizontal plane) that is spaced apart from the first plane.

Regarding claim 16, Frazier discloses (see Figure 6) a semiconductor device, comprising: a semiconductor chip (208) and a light-receiving element (214) formed in the semiconductor chip for receiving an optical signal, wherein the semiconductor chip is disposed in a first plane (a first horizontal plane); and an optical signal transfer device (212) directly connected (see also column 4, lines 62-64) to the light-receiving element for transferring the optical signal into the semiconductor chip, wherein the optical signal

transfer device is disposed in a second plane (a second horizontal plane) that is spaced apart from the first plane.

10. Claim 3 is rejected under 35 U.S.C. 102(b) as being anticipated by Kitamura (U.S. Patent 5,250,816).

Regarding claim 3, Kitamura discloses (see Figures 9 and 11) a semiconductor device, comprising: a semiconductor chip (11) mounted on a mounting substrate (2) and a light-receiving element (11a) formed in the semiconductor chip for receiving an optical signal; an optical signal transfer device (22, 17) embedded in the mounting substrate, wherein the optical signal transfer device directly contacts (see Figure 11) the light-receiving element for transferring the optical signals into the semiconductor chip; and a package (15) that is in contact with and that seals the semiconductor chip and a part of the optical signal transfer device.

11. Claim 12 is rejected under 35 U.S.C. 102(b) as being anticipated by Reid, deceased et al. (U.S. Patent 5,159,700), hereinafter, Reid.

Regarding claim 12, Reid discloses (see Figures 6a and 6b) a semiconductor device, comprising: a mounting substrate (silicon substrate 61); at least one optical transfer device (63) embedded (see column 5, lines 50-55) in the mounting substrate, wherein the at least one optical transfer device is adapted to transfer an optical signal; a plurality of semiconductor chips (VLSI 65) mounted on the mounting substrate; and a light-receiving element (67) formed in at least one of the semiconductor chips and that is connected to the optical signal transfer device for receiving the optical signal, wherein the optical signal is transferred among the plurality of semiconductor chips through the

optical signal transfer device, wherein the optical signal transfer is formed in a lattice configuration and embedded in the mounting substrate, wherein a plurality of selected ones of the optical signal transfer devices extend in a first direction (vertical), and wherein a plurality of the selected others of the optical signal transfer devices extend in a second direction (horizontal) different from the first direction and intersect the plurality of selected ones of said optical signal transfer devices.

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. Claims 5 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bausman et al. (U.S. Patent 5,442,475).

Regarding claim 5, Bausman et al. disclose (see Figures 1 and 4) a semiconductor device, comprising: a mounting substrate (24) and at least one optical signal transfer device (50) embedded (see column 6, line 15) in the mounting substrate for transferring an optical clock signal; a plurality of semiconductor chips (26.1, 26.2) mounted on the mounting substrate; and light-receiving element (not shown; see column 4, line 42) formed in the at least one semiconductor chips and that contacts the optical signal transfer device for receiving the optical clock signal; and wherein the optical clock signal is transferred among the plurality of semiconductor chips through the optical signal transfer device. Bausman et al. do not specifically disclose the direct

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contact of the optical signal transfer device to the light-receiving element. However, it is well known in the art to directly connect optical signal transfer devices to detectors.

Thus, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide a direct connection in the apparatus of Bausman et al. to reduce light loss between the two elements and improve detection. Furthermore, the choice of direct connection is a matter of design choice and requires only routine skill in the art.

Regarding claim 13, Bausman et al. disclose (see Figures 1 and 4) a semiconductor device, comprising: a mounting substrate (24) and at least one optical fiber (50) disposed in a first plane and embedded (see column 6, line 15) in the mounting substrate for transferring an optical signal; a plurality of semiconductor chips (26.1, 26.2) mounted on the mounting substrate, wherein the semiconductor chips are disposed in a second plane that is spaced apart from the first plane; and light-receiving element (not shown; see column 4, line 42) formed in the at least one semiconductor chips and that contacts the optical fiber for receiving the optical clock signal; and wherein the optical signal is transferred among the plurality of semiconductor chips through the optical fiber. Bausman et al. do not specifically disclose the direct contact of the optical signal transfer device to the light-receiving element. However, it is well known in the art to directly connect optical signal transfer devices to detectors. Thus, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide a direct connection in the apparatus of Bausman et al. to reduce

light loss between the two elements and improve detection. Furthermore, the choice of direct connection is a matter of design choice and requires only routine skill in the art.

14. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kitamura.

Regarding claim 2, Kitamura also discloses (see Figures 9 and 11) using optical fibers as the optical signal transfer device. Kitamura does not specifically disclose using one optical fiber. However, substituting two optical fibers for one optical fiber requires only routine skill in the art. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide an optical fiber as the optical signal transfer device in the apparatus of Kitamura to allow for more tolerance in aligning the packages.

Allowable Subject Matter

15. Claims 11 and 15 are allowed over the prior art of record.

16. Claim 14 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, first and second paragraph, set forth in this Office action.

17. The following is a statement of reasons for the indication of allowable subject matter: a semiconductor device, as claimed, more specifically in combination with: a cylindrical shape light-receiving element inserted in contact holes and bonded to the optical signal transfer device is not disclosed or made obvious by the prior art of record.

Response to Arguments

18. Applicant's arguments with respect to claims 3, 5, 12, 13 and 16 have been considered but are moot in view of the new ground(s) of rejection.

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Conclusion

19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanh X. Luu whose telephone number is (703) 305-0539. The examiner can normally be reached on Monday-Friday from 6:30 AM - 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta, can be reached on (703) 308-4852. The fax phone number for the organization where the application or proceeding is assigned is (703) 308-7722.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

txl
March 7, 2003



Thanh X. Luu
Patent Examiner